

Comparison of Four Precipitation Forcing Datasets in Land Information System Simulations over the Continental U.S.

Jonathan L. Case^{1*}, Sujay V. Kumar², Robert J. Kuligowski³, and Carrie Langston⁴

¹ ENSCO Inc./NASA Short-term Prediction Research and Transition (SPoRT) Center
320 Sparkman Dr., Room 3008, Huntsville, AL 35805

Voice: 256.961.7504

Fax: 256.961.7788

² SAIC/NASA Goddard Space Flight Center, Greenbelt, MD

³ NOAA/NESDIS/Center for Satellite Applications and Research, Camp Springs, MD

⁴ Cooperative Institute for Mesoscale Meteorological Studies, Norman, OK

The NASA Short-term Prediction Research and Transition (SPoRT) Center in Huntsville, AL is running a real-time configuration of the NASA Land Information System (LIS) with the Noah land surface model (LSM). Output from the SPoRT-LIS run is used to initialize land surface variables for local modeling applications at select National Weather Service (NWS) partner offices, and can be displayed in decision support systems for situational awareness and drought monitoring. The SPoRT-LIS is run over a domain covering the southern and eastern United States, fully nested within the National Centers for Environmental Prediction Stage IV precipitation analysis grid, which provides precipitation forcing to the offline LIS-Noah runs. The SPoRT Center seeks to expand the real-time LIS domain to the entire Continental U.S. (CONUS); however, geographical limitations with the Stage IV analysis product have inhibited this expansion. Therefore, a goal of this study is to test alternative precipitation forcing datasets that can enable the LIS expansion by improving upon the current geographical limitations of the Stage IV product.

The four precipitation forcing datasets that are inter-compared on a 4-km resolution CONUS domain include the Stage IV, an experimental GOES quantitative precipitation estimate (QPE) from NESDIS/STAR, the National Mosaic and QPE (NMQ) product from the National Severe Storms Laboratory, and the North American Land Data Assimilation System phase 2 (NLDAS-2) analyses. The NLDAS-2 dataset is used as the control run, with each of the other three datasets considered experimental runs compared against the control. The regional strengths, weaknesses, and biases of each precipitation analysis are identified relative to the NLDAS-2 control in terms of accumulated precipitation pattern and amount, and the impacts on the subsequent LSM spin-up simulations. The ultimate goal is to identify an alternative precipitation forcing dataset that can best support an expansion of the real-time SPoRT-LIS to a domain covering the entire CONUS.

Submitted to the 27th Conference on Hydrology, Austin, TX, 6–10 January 2013